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MOTIVATIONAL PREDICTORS OF USE OF A STATIONARY EXERCISE
BICYCLE DURING SUBMARINE DEPLOYMENT(U) NAVAL HEALTH
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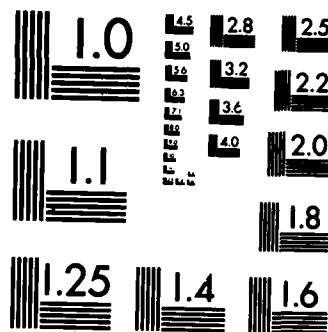
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MOTIVATIONAL PREDICTORS OF USE OF A STATIONARY EXERCISE
BICYCLE DURING SUBMARINE DEPLOYMENT

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SUMMARY

The success of the Navy's physical fitness and readiness program depends on motivating individuals to become more fit. Expectancy-value (EV) theory may provide motivation measures that could help develop programs which will achieve the Navy's fitness objectives. EV theory assumes that people are motivated to participate in activities that produce desirable outcomes and/or avoid undesirable outcomes. This study was undertaken to determine how well EV motivation measures predicted use of fitness facilities in an operational Navy environment. EV measures were also compared to other questionnaire measures of fitness motivation.

One hundred and two men of a 136-man attack nuclear submarine crew (a) rated the desirability of 16 possible exercise outcomes (e.g., relaxation, better health) and (b) estimated the probability that riding the bicycle ergometer would produce each outcome. An EV motivation score was computed by multiplying the value assigned to each outcome by the probability that riding the bike would provide the outcome and summing across outcomes.

Standard questionnaires measured (a) persistence, (b) self-estimated physical ability, (c) liking for physical activity, and (d) general reasons why the person exercised, including (i) self-improvement, (ii) social/recreational reasons, and (iii) organizational requirements.

A bicycle ergometer with microprocessor instrumentation was installed on the submarine for a 185-day deployment. Frequency of bicycle use by study participants was determined from printed records produced by the bicycle at the end of each ride.

Major findings were: (a) Study participants averaged one ride per man every 4 weeks while underway. (b) The bicycle EV motivation score predicted bicycle use only after participants who may have had biased questionnaire responses were excluded. Even then, the observed associations were weak. (c) Self-improvement was the only standard motivation scale that significantly predicted bicycle use. Like the EV measure, this scale was only modestly correlated with bicycle use.

The EV measure and the self-improvement scale both focus on what the person "gets out of it" when he exercises. Therefore, the significant results in the study supported the logic of the EV approach. Methodological improvements might make the EV predictions more accurate, but response bias problems represent a substantial barrier to success. No matter what the final conclusion with respect to EV theory, the data clearly indicated the need for an understanding of factors influencing use of fitness facilities. The infrequent use of the bicycle shows that simply providing facilities will not ensure that they are used.

INTRODUCTION

The Navy has recently implemented a health and physical readiness program to enhance operational readiness (1). The potential benefits of the program will be realized only if people participate. Because participation is voluntary, program effectiveness depends on the motivation of individuals (1). Motivational factors related to health and fitness are therefore clearly important to program success, but the measurement of motivation in these areas is not a well-developed topic. Therefore, this study explored the possibility of using expectancy-value (EV) theory to assess motivation for exercise. Positive results would provide a technique which could be used to compare specific fitness programs which the Navy might consider implementing. Exercise was the focal behavior because it is an important component of most fitness programs.

EV theory assumes that motivation for an activity depends on (a) what outcomes may be obtained by engaging in the activity and (b) how important those outcomes are to the person. People are assumed to be motivated to participate in activities they believe will produce desirable outcomes and/or avoid undesirable outcomes. In this view, motivation for fitness depends on attributes of the person (i.e., values assigned to specific outcomes) and his or her perceptions of the payoffs from fitness activities (i.e., expectancy of getting outcomes by engaging in exercise activities).

EV motivation measures may provide a means of overcoming a weakness of available fitness motivation questionnaires. Available questionnaires treat motivation for physical activity as a characteristic of the person and ignore the motivational characteristics of specific physical activities (e.g., 2-4). The resulting information can be used to compare people with respect to their general motivation for physical activity and may be useful for identifying fitness program dropouts before a program is begun (4,5). Unfortunately, the lack of information about specific activities means that these questionnaires cannot be used to compare different fitness programs.

EV motivation measures potentially can compare programs. The comparison would be accomplished by evaluating how well each program provides outcomes that are important to the target population. Such program comparison could be used to design programs that achieve high participation rates by "giving the people what they want" (subject to the constraint that the program must achieve certain fitness objectives). Given the Navy's recognition that motivating individuals to participate in fitness programs is important to achieving health and physical readiness objectives (1), developing programs that attract and retain as many participants as possible is very important.

At present, EV theory is an attractive conceptual model which is largely untested with respect to its ability to produce meaningful measures of fitness motivation. Therefore, EV

motivation measures should be validated as predictors of exercise behavior before EV measures are actually employed to compare different fitness programs. Previous studies employing EV-based approaches have produced encouraging results (6-8). However, those studies have not predicted actual behavior over extended time periods in an operational Navy environment. In addition, EV measures have not been compared to alternative measures of motivation for physical activity.

This study employed EV measures and three standard fitness motivation questionnaires to predict use of a stationary exercise bicycle during a six-month submarine deployment. Although alternative fitness programs were not compared, the findings can indicate whether EV measures predict long-term participation in an exercise activity. If so, the measures are meaningful indicators of motivation and the extension to comparing programs is straightforward. Specific study objectives were to:

- (a) Provide an initial evaluation of how well EV motivation measures predict actual exercise behavior in an operational Navy setting.

- (b) Compare EV measures to other commonly used "motivation" scales as predictors of exercise behavior.

- (c) Evaluate the importance of factors which might modify the relationship between measured motivation for exercise and actual behavior.

Objective (c) attempts to identify factors which should be taken into account in further development of EV theory applications.

METHODS

Sample

Participants were 102 informed volunteers from the 136-man crew of a nuclear submarine. The average age of the participants was 24.6 years with a range from 18 to 41. These volunteers completed a medical history and a maximal bicycle ergometer test upon entry into the study to ensure that riding the bicycle ergometer did not represent a major health risk. The screening eliminated one potential participant.

EV Measures

An "Activities Questionnaire" (AQ) provided EV measures of motivation. Sixteen outcomes were selected from previous research on reasons for exercise and consideration of motivating factors which may be specific to the Navy (e.g., need to prepare for the annual fitness test). The sixteen outcomes represented four general categories: (a) physical (e.g., fatigue, health), (b) psychological (e.g., tension, relaxation), (c) interpersonal (e.g., being with others, getting respect), and (d) job-related (e.g., being able to work better, having the activity interfere with job performance). Positive and negative outcomes were included for each category. The full questionnaire is given in Appendix A.

Participants first rated the importance of each of the 16 outcomes using a scale from -10 ("I would do almost anything to avoid it.") to +10 ("I would do almost anything for it."). Following this, the probability that each outcome would result from each of three activities was estimated on a scale ranging from 0 (Never) to 100 (Always). The activities were (a) riding the stationary bike, (b) studying, and (c) entertainment. Overall, 48 probability estimates were made, one for each combination of an activity with a specific outcome. Studying and entertainment estimates were included to permit comparisons of motivation for riding the bicycle with motivation for the major types of activity that would compete for use of free time during the deployment. This comparison could be more important than the absolute motivation for any single activity (9). For example, a highly motivated person may not ride the bicycle if the motivation for studying is even stronger.

The bicycle EV score was computed as follows: (a) The value the individual assigned to each of the 16 outcomes was multiplied by his estimate of the probability that riding the bicycle would produce that outcome. (b) The 16 resulting expected values were summed to produce an overall motivational measure. Similar EV scores were computed for entertainment and studying using the outcome probability estimates given for those activities.

Other Motivation Questionnaires

Standard person-centered measures of motivation for physical activity were obtained by administering three questionnaires selected because they were specifically designed to measure motivational constructs and had been previously used to predict adherence to fitness programs. These questionnaires were:

(a) Reasons for Exercise. This 11-item instrument consisted of Sidney and Shepard's (10) modification of Kenyon's (11) Attitudes Toward Physical Activity scales with items added to replicate earlier work with Navy aviators (12) and exercising to meet the Navy's new fitness requirements. The entire questionnaire is presented in Appendix B. Items were combined into three scales to reflect general reasons for exercising: Self-Improvement (6 items, $\alpha^1 = .79$), Social Recreation (3 items, $\alpha = .69$), and Organizational Requirements (2 items, $\alpha = .69$).

(b) Self-Motivation Inventory. This 40-item instrument measures persistence in activities, particularly physical activities, once the person begins them. This instrument was developed by Dishman and his colleagues and has consistently discriminated between dropouts and adherers in physical training programs (4,5).

¹The internal consistency of a composite of items was estimated in this study by Cronbach's alpha coefficient (α).

(d) Physical Estimation and Attraction Scales (PEAS). The PEAS yields scales indicating the person's evaluation of his physical ability relative to the average person (Estimation) and his liking for physical activity compared to more sedentary activities (Attraction). These scales were developed by Sonstroem (13).

Potential Modifiers of the Motivation-Behavior Relationship

A person who is highly motivated for a given activity may still fail to engage in that activity for various reasons. We therefore investigated the following factors as possible modifiers of the relationship between measured motivation and behavior:

- (a) Good and bad experiences with the stationary bicycle were considered because events which took place after we measured motivation might change estimated outcome probabilities with a resulting change in motivation.
- (b) Whether there had been time to use the bicycle during deployment was determined because even a highly motivated person cannot ride the bike if duties or other commitments left too little time to do so.
- (c) What other types of exercise were engaged in during the deployment was determined because such exercise might substitute for riding the bicycle as a means of satisfying the motive to exercise.
- (d) The tendency to bias responses to fitness motivation questionnaires was considered because biased reports of motivation would not be expected to predict behavior.

Seventy-two participants completed a post-deployment questionnaire which provided information regarding the first three potential modifiers. Response bias was measured by the "Fake Good Attraction" and "Fake Bad Attraction" scales developed from the PEAS by Dishman (14).

Assessing Stationary Bicycle Use. A stationary bicycle ergometer with microprocessor instrumentation was installed aboard the submarine for the deployment during which the study took place. At the beginning of each bicycle ride, the rider punched in his assigned identification number and put on an ear clip which provided signals for pulse rate monitoring. A continuous digital display showed cumulative time, current pedal speed, heart rate, and workload (in kiloponds per minute) during the ride. A printed summary provided at the end of the ride included name, date, length of time ridden, cumulative averages for pedal speed, heart rate, and workload. An estimate of total kilocalories expended and miles ridden was also part of the summary. A copy of this output was provided to be placed in a data collection box as the study record of the ride.

The basic dependent variable in this study was the frequency of bicycle use. Bicycle use was determined for four time periods because EV scores may predict short-term behavior better than long-term behavior (15). The specific time periods were (i) the first 14 days of deployment (9 days underway), (ii) the next 20 days (10 days underway), (iii) a third 44-day period (38 days underway), and (iv) the final 107 days of deployment (62 days underway). The first three periods represented the first three cruises between ports plus the associated in-port periods. The fourth

period encompassed several separate cruises which were grouped together because there was so little bicycle use during this period. The effective length of each time period was the number of days underway because very few rides were taken while the submarine was in port (see below).

RESULTS

Overall Bicycle Use. The overall pattern of bicycle use provided several interesting points:

- (a) The bicycle was ridden 432 times during the deployment.
- (b) One-hundred and seven rides (24.8% of the total) occurred during the first 9 days underway. The full deployment was 185 days with 119 days underway.
- (c) Total rides per day averaged 11.8 for the first time period, 6.3 for the second, 3.1 for the third and 2.1 for the fourth.
- (d) Only 10 rides were taken during the 66 days the submarine was in port; 5 of these occurred on one day.
- (e) Study participants averaged 2.3 rides for every 100 man/days (approximately 1 ride per man every 6 weeks). While underway, the figure was 3.5 rides per 100 man/days (approximately 1 ride per man every 4 weeks). These figures would be lower if the total crew were the basis for computation.

These findings indicate infrequent use of the bicycle with most use occurring very early in the deployment.

Bicycle Use by Individuals. Individual patterns of bicycle use are summarized in Table 1.

TABLE 1
PATTERN OF BICYCLE UTILIZATION
DURING SIX-MONTH DEPLOYMENT

	TIME PERIOD ^a	MEAN	S. D. ^b	NUMBER OF RIDES		PER/WK ^e
				MIN ^c	MAX ^d	
Actual Rides	1	1.05	1.67	0	9	0.82
	2	0.69	1.54	0	7	0.48
	3	1.17	2.79	0	16	0.22
	4	1.33	4.19	0	33	0.15

NOTE: Sample size is 102.

^aSee Methods section for definition of cruise periods.

^bS. D. = Standard Deviation

^cMIN = Minimum number of rides taken by any one participant during the time period.

^dMAX = Maximum number of rides taken by any one participant during the time period.

^ePER/WK indicates the number of rides for each 7 days underway. Time underway was the basis for comparison across time periods because only 10 rides took place in port.

In addition, it was noted that:

- (a) Only 58 men (58% of the sample) rode the bike even once. More men might have used the bicycle, but crewmen who were not participating in the study were not encouraged to use the bicycle because they had not been tested to ensure that there was minimal medical risk to them.
- (b) Only 13 men (10%) rode as many as 10 times; the maximum number of rides by one man was 44.
- (c) Three men accounted for 115 of the 432 rides (i.e., 27% of the total).

Because of the extreme scores obtained by a few participants, subsequent analyses used nonparametric statistics.

Predicting Bicycle Riding Behavior. None of the motivational measures were strong predictors of bicycle use. The Self-Improvement Scale was the best predictor of bicycle use (Table 2). The bike EV scale produced marginally significant predictions early in the cruise.

TABLE 2
RANK ORDER CORRELATIONS BETWEEN NUMBER OF BIKE RIDES
AND MOTIVATION SCORES

TIME PERIOD:	CORRELATION WITH NUMBER OF RIDES DURING PERIOD			
	1	2	3	4
Bicycle EV Score	.13*	.11*	.07	.06
Entertainment EV Score	.09	.03	.11	.08
Studying EV Score	.05	.06	.09	.15**
PEAS Estimation	-.07	-.11	.02	-.02
PEAS Attraction	-.02	-.05	.06	.02
Self-Motivation Inventory	-.11	-.05	.01	.06
Self-Improvement Scale	.09	.14**	.16**	.16**
Social/Recreational	-.08	-.05	.01	.00
Organizational Requirements Scale	.04	.10	.08	.06

NOTE: Table entries are Kendall's taus. Tau was chosen as the correlation coefficient because the data included many tied observations for number of rides. Sample size is between 96 and 102 for each correlation.

* $p < .10$ (one-tailed)

** $p < .05$ (one-tailed)

Follow-up analyses considered additional motivation scores derived from the Activities Questionnaire, including (a) differences between motivation for riding the bicycle and motivation for entertainment or studying and (b) ratios of positive to negative motivation for the bicycle. The latter scoring procedure was based on recent work by Atkinson and his colleagues (16). The alternative scores did not predict as well as the simple EV measure. Analysis details available on request.

Modifiers of the Motivation-Behavior Association. Four possible modifiers of motivation-behavior relationships were described in the methods section. The effects of these possible modifiers were determined by comparing the relationship between motivation and behavior obtained among high scorers to the relationship obtained among low scorers. Only response bias substantially modified relationships. Predictions were more accurate when participants with biased scores were removed, but the upper limit of predictive accuracy was still unimpressive (Table 3). Two different exclusion criteria were used to remove participants with possible response biases. The EV scores were evidently very sensitive to biases because prediction improved as the exclusion criterion became more extreme. The Self-Improvement scores showed less overall improvement and improved primarily when the less stringent exclusion criterion was the basis for exclusion. Overall, it appears that response biases may be a significant problem when assessing motivation for physical fitness.

TABLE 3
RANK ORDER CORRELATIONS BETWEEN NUMBER OF BIKE RIDES
AND SELECTED MOTIVATION SCORES
WITH RESPONSE DISTORTERS REMOVED

	TIME PERIOD	TOTAL	SAMPLE:	
			GE4 ^a	GE3 ^b
Bicycle EV Score	1	.13*	.21**	.19**
	2	.11*	.20**	.25**
	3	.07	.16*	.19**
	4	.06	.11	.19**
Self-Improvement Scale	1	.09	.11	.03
	2	.14**	.20**	.03
	3	.16**	.21**	.15*
	4	.16**	.26***	.26**

NOTE: Kendall's τ was used because of the number of tied observations for bicycle rides. Bicycle EV Score and Self-Improvement Scale were selected as the only variables that were consistent predictors in the initial correlation analyses.

^aCriterion for exclusion from this analysis was a "Fake Good Attraction" score of 4 or more and a "Fake Bad Attraction" score of 4 or more. Remaining sample size is $n = 67$ for Bicycle EV score and $n = 68$ for Self-Improvement Scale.

^bCriterion for exclusion from this analysis was a "Fake Good Attraction" score of 3 or more and a "Fake Bad Attraction" score of 3 or more. Remaining sample size is $n = 46$ for Bicycle EV score and $n = 47$ for Self-Improvement Scale.

* $p < .10$

** $p < .05$

*** $p < .01$

DISCUSSION

One study objective was to determine how well an EV-based motivation measure would predict exercise behavior. The EV model, as formulated here, significantly predicted bicycle use only when a large number of participants who may have had biased motivation estimates were excluded.²

A second objective was to compare the EV measures to standard motivation scales. The EV measure was a better predictor of exercise behavior than all of the standard scales in the study except the Self-Improvement Scale. The Self-Improvement Scale produced better results than the EV measure because fewer people had to be excluded as biased responders to achieve a comparable level of predictive accuracy. Note, however, that Self-Improvement scores indicate reasons for exercising, i.e., what the person "gets out of it." The Self-Improvement Scale is similar to the EV approach in this regard. Overall, therefore, the scattered significant findings in this study support the logic of the EV model even though only weak predictions were achieved.

A final study objective was to examine the effects of several factors which might modify the relationship between measured motivation and behavior. The only important modifier was response bias. Any subsequent applications of EV models to exercise prediction would benefit from reducing the influence of such bias.

The study results supported the logic of the EV model, but individual predictions were too inaccurate to make this approach immediately useful to program designers. Conclusions regarding the potential utility of the EV approach to motivation should keep in mind the limitations of the present study. Only one type of exercise activity was considered and in only one population. In addition, several modifications of the EV measures might improve on our initial measures, including: (a) Measuring motivation for exercising with some stated frequency (e.g., once a week, twice a week, etc.) rather than assessing overall motivation to exercise. (b) Using a different list of outcomes as important ones may have been inadvertently omitted from our list. (c) Using different measurement techniques (e.g., magnitude estimation, functional measurement) to improve response scaling. These issues represent possible topics for future research. However, the apparent

²Earlier summaries of this study relied on parametric statistics rather than the nonparametric statistics used here. In those analyses, the predictive accuracy of the EV scores tended to decrease from the first to the last cruise period (Period 1, $r = .17$; Period 2, $r = .13$; Period 3, $r = .13$; Period 4, $r = .07$). These correlations increased when participants with potentially biased responses were excluded from the analysis (Period 1, $r = .28$; Period 2, $r = .29$; Period 3, $r = .23$; Period 4, $r = .14$). These data would support the conjecture that EV measures predict well only shortly after they are taken (15). However, the skewed nature of the ride distributions makes the use of parametric statistics a questionable procedure. This report therefore does not claim that the bicycle EV measure becomes a weaker predictor of behavior over time.

sensitivity of EV measures to response distortion suggests a substantial barrier to success with this model.

No matter what the final conclusions regarding the usefulness of EV motivation measures may be, the study findings clearly illustrate the need for a better understanding of what determines patterns of use of exercise facilities. The men of the submarine crew exercised too infrequently to benefit physically. Obviously, simply providing exercise facilities will not ensure that people exercise. Navy fitness programs will have to deal with this fact in some way.

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Appendix A

EXPECTANCY THEORY MOTIVATION QUESTIONNAIRE

NAME: _____ SSN: _____ DATE _____

ACTIVITIES QUESTIONNAIRE

- I. Below is a list of things a person can experience as a result of engaging in various activities. Using the scale below, please rate how valuable each of these things are to you. There are no correct answers; we want to know how important they are to you personally. You can use any value from -10 to 10 to indicate how important each thing is to you.

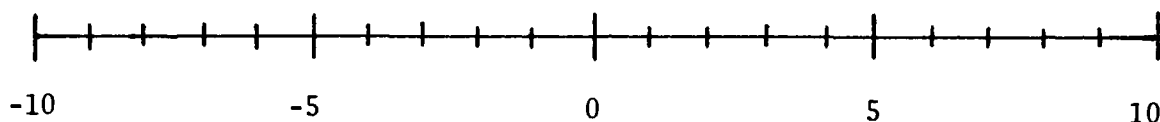
I would do
almost anything
to avoid it

I would
try to
avoid it

I don't care
one way or
the other

I would
like it

I would do
most anything
for it

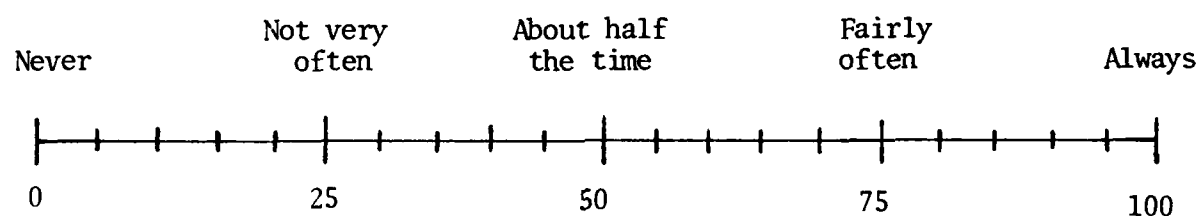


VALUE RATING

- a. Feel physically tired, hurt, weak, etc. _____
- b. Feel pressured by others to do something else _____
- c. Perform my job less well _____
- d. Feel tense, nervous, depressed, bored, etc. _____
- e. Be healthy _____
- f. Spend time with other people _____
- g. Advance in my Navy career _____
- h. Feel upset with myself _____
- i. Control my weight _____
- j. Be made fun of by others _____
- k. Perform my job better _____
- l. Feel relaxed and at ease _____
- m. Be physically attractive _____
- n. Be respected by others _____
- o. Feel good about myself _____
- p. Feel good physically _____

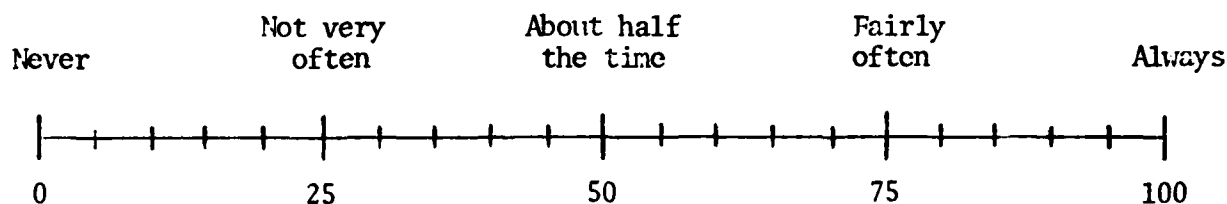
II. While on deployment, you will have some free time after taking care of job duties and necessary personal activities such as eating and sleeping. Because that free time is limited, you may have to choose between different ways to spend it. You might choose entertainment such as watching movies, reading books or magazines, playing cards, or "shooting the bull" with buddies. You might spend time studying to prepare for new watches or taking correspondence courses. On your next deployment, you will also have the opportunity to exercise on the stationary bicycle that will be available.

What you choose to do with your free time probably depends on what you get out of the activity. Examples of possible outcomes are the ones you rated on the preceding page. On the following pages, we want you to tell us what you think the chances are of getting those outcomes from the activities listed above. Please indicate your answers using the scale below. On this scale, "0" indicates that you think the activity will never produce the outcome. For example, reading may never lead to weight loss. "100" indicates that the activity will always produce the outcome. For example, "bull sessions" may always be relaxing. On the following pages, you will be presented with a number of activity-outcome pairs. You may use any number between 0 and 100 to indicate the chances that the activity will produce the outcome. In making your responses, it may be easier to think of the numbers as indicating how good an activity is at producing a given outcome "on the average." Judgments will sometimes be difficult, but please do the best you can.



[TURN TO NEXT PAGE]

II-A. Please estimate what you think the chances are of experiencing each of the outcomes listed below as a result of engaging in various forms of entertainment. Select your answers using the scale below, then write your estimates in the spaces provided.

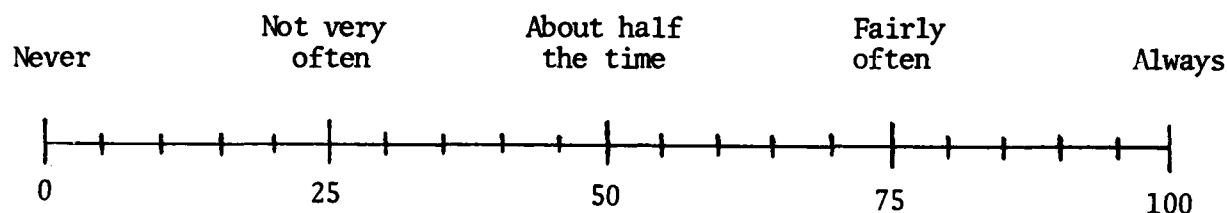


"If I were to spend a lot of my free time on entertainment such as watching movies, reading, playing cards, of 'shooting the bull' with buddies, I would . . ."

	ESTIMATE
a. Feel physically tired, hurt, weak, etc.	_____
b. Feel pressured by others to do something else	_____
c. Perform my job less well	_____
d. Feel tense, nervous, depressed, bored, etc.	_____
e. Be healthy	_____
f. Spend time with other people	_____
g. Advance in my Navy career	_____
h. Feel upset with myself	_____
i. Control my weight	_____
j. Be made fun of by others	_____
k. Perform my job better	_____
l. Feel relaxed and at ease	_____
m. Be physically attractive	_____
n. Be respected by others	_____
o. Feel good about myself	_____
p. Feel good physically	_____

[TURN TO NEXT PAGE]

II-B. Please estimate what you think the chances are of experiencing each of the outcomes listed below as a result of riding the stationary bicycle. Select your answers using the scale below, then write your estimates in the spaces provided.

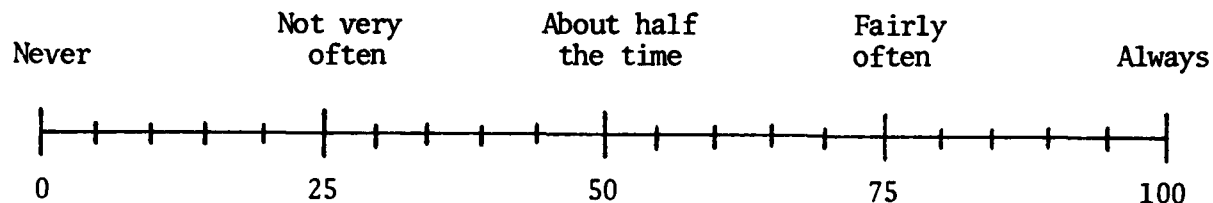


"If I were to regularly exercise moderately hard on the stationary bicycle, I would..."

	ESTIMATE
a. Feel physically tired, hurt, weak, etc.	_____
b. Feel pressured by others to do something else.	_____
c. Perform my job less well.	_____
d. Feel tense, nervous, depressed, bored, etc.	_____
e. Be healthy	_____
f. Spend time with other people.	_____
g. Advance in my Navy career	_____
h. Feel upset with myself	_____
i. Control my weight	_____
j. Be made fun of by others	_____
k. Perform my job better	_____
l. Feel relaxed and at ease	_____
m. Be physically attractive	_____
n. Be respected by others	_____
o. Feel good about myself	_____
p. Feel good physically	_____

[TURN TO NEXT PAGE]

II-C. Please estimate what you think the chances are of experiencing each of the outcomes listed below as a result of studying during free time. Select your answers using the scale below, then write your estimates in the spaces provided.



"If I were to spend a lot of free time studying, I would . . ."

	ESTIMATE
a. Feel physically tired, hurt, weak, etc.	_____
b. Feel pressured by others to do something else	_____
c. Perform my job less well	_____
d. Feel tense, nervous, depressed, bored, etc.	_____
e. Be healthy	_____
f. Spend time with other people	_____
g. Advance in my Navy career	_____
h. Feel upset with myself	_____
i. Control my weight	_____
j. Be made fun of by others	_____
k. Perform my job better	_____
l. Feel relaxed and at ease	_____
m. Be physically attractive	_____
n. Be respected by others	_____
o. Feel good about myself	_____
p. Feel good physically	_____

[THIS IS THE LAST PAGE]

Appendix B

QUESTIONS MEASURING REASONS FOR EXERCISING

1. I exercise for health and fitness.¹
2. I exercise to release tension.¹
3. I exercise for games and competition.²
4. I exercise to have fun and socialize.²
5. I exercise to socialize and make friends.²
6. I exercise as a form of self-discipline.¹
7. I exercise to make my body attractive at rest and in motion.¹
8. I exercise to control my weight.¹
9. I exercise because I am required to.³
10. I exercise because I feel good after exercising.¹
11. I exercise to be able to meet the Navy's physical fitness standards.³

¹Item is included in the Self-Improvement scale.

²Item is included in the Social/Recreation scale.

³Item is included in the Organizational Requirements scale.

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20. Abstract (continued)

social/recreation, organizational requirements). Findings were: (a) The EV and self-improvement measures were weak, but significant, predictors of bicycle use. Both measures were sensitive to response biases. Because both of the significant predictors of bicycle use reflect what a person gets out of exercising, the results supported the logic of the EV approach to motivation. However, substantial improvements would be needed to use either of the significant predictors for applied purposes. (b) The bicycle was used infrequently, illustrating that providing exercise facilities does not ensure their use. Understanding what determines utilization rates is therefore important to the success of fitness programs.

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SUMMARY

The success of the Navy's physical fitness and readiness program depends on motivating individuals to become more fit. Expectancy-value (EV) theory may provide motivation measures that could help develop programs which will achieve the Navy's fitness objectives. EV theory assumes that people are motivated to participate in activities that produce desirable outcomes and/or avoid undesirable outcomes. This study was undertaken to determine how well EV motivation measures predicted use of fitness facilities in an operational Navy environment. EV measures were also compared to other questionnaire measures of fitness motivation.

One hundred and two men of a 136-man attack nuclear submarine crew (a) rated the desirability of 16 possible exercise outcomes (e.g., relaxation, better health) and (b) estimated the probability that riding the bicycle ergometer would produce each outcome. An EV motivation score was computed by multiplying the value assigned to each outcome by the probability that riding the bike would provide the outcome and summing across outcomes.

Standard questionnaires measured (a) persistence, (b) self-estimated physical ability, (c) liking for physical activity, and (d) general reasons why the person exercised, including (i) self-improvement, (ii) social/recreational reasons, and (iii) organizational requirements.

A bicycle ergometer with microprocessor instrumentation was installed on the submarine for a 185-day deployment. Frequency of bicycle use by study participants was determined from printed records produced by the bicycle at the end of each ride.

Major findings were: (a) Study participants averaged one ride per man every 4 weeks while underway. (b) The bicycle EV motivation score predicted bicycle use only after participants who may have had biased questionnaire responses were excluded. Even then, the observed associations were weak. (c) Self-improvement was the only standard motivation scale that significantly predicted bicycle use. Like the EV measure, this scale was only modestly correlated with bicycle use.

The EV measure and the self-improvement scale both focus on what the person "gets out of it" when he exercises. Therefore, the significant results in the study supported the logic of the EV approach. Methodological improvements might make the EV predictions more accurate, but response bias problems represent a substantial barrier to success. No matter what the final conclusion with respect to EV theory, the data clearly indicated the need for an understanding of factors influencing use of fitness facilities. The infrequent use of the bicycle shows that simply providing facilities will not ensure that they are used.

